

REMARKS/ARGUMENTS

Claims Status

Claims 1-3, 5, 6 and 8-18 are pending. Claims 4 and 7 were previously canceled without prejudice. Claims 3, 5, 6, 10-12 and 15-17 are currently amended such that the term “comprising” is changed to “consisting essentially of” to coincide with the independent claims from which they depend. No new matter is believed to have been added.

§112 Rejection - Withdrawn

Applicants thank Examiner Yang for the withdrawal of the rejection of claims 1 and 13 under 35 U.S.C. §112, first paragraph, for lack of support for amending “containing/comprising” to “consisting essentially of”.

However, in “Response to Arguments” in the Office Action dated April 16, 2009, the Office informs Applicants that the transitional phrase “consisting essentially of” will be construed as equivalent to “comprising” unless Applicants show that the introduction of additional steps or components would materially change the characteristics of Applicants’ invention (Office Action, paragraph bridging pages 7-8). Applicants contend that they have already provided such a showing in the response filed on January 21, 2009 (pages 8-9), as follows (emphasis added):

“Applicants again point out the following. M.P.E.P. §2111.03 states:

The transitional phrase “consisting essentially of” limits the scope of a claim to the specified materials or steps “and those that do not materially affect the basic and novel characteristic(s)” of the claimed invention. *In re Herz*, 537 F.2d 549, 551-52, 190 USPQ 461, 463 (CCPA 1976) (emphasis in original)

The M.P.E.P. elaborates further with reference to *AK Steel Corp. v. Sollac*, 344 F.3d 1234, 1240-41, 68 USPQ2d 1280, 1283-84 (Fed. Cir. 2003):

Applicant's statement in the specification that “silicon contents in the coating metal should not exceed about 0.5% by weight” along with a discussion of the deleterious effects of silicon provided basis to conclude that

silicon in excess of 0.5% by weight would materially alter the basic and novel properties of the invention. Thus, "consisting essentially of" as recited in the preamble was interpreted to permit no more than 0.5% by weight of silicon in the aluminum coating.

In accordance with the foregoing, Applicants' assert that mass % values of C, Si, Mn, P and S outside the ranges as claimed (e.g., see claim 1) would materially alter the basic and novel properties of the presently claimed invention. More specifically, the current specification elaborates on each of these elements individually, starting on page 12, line 25, to page 14, line 16, as reproduced below:

- "C is an element indispensable for securing a strength required of a wire rod and C of 0.6% or more is added accordingly. A C content is preferably 0.65% or more, yet preferably 0.7% or more. On the other hand, when a C content exceeds 1.0%, it becomes difficult to inhibit pro-eutectoid cementite, which functions as origins of wire breakage, in the cooling process after hot-rolling. A preferable C content is 0.95% or less." (page 13, lines 8)
- "Si is an element that increases the strength of ferrite in pearlite and contributes to the adjustment of strength and is also useful as a deoxidizing agent. In order to exhibit such functions effectively, Si must be added by 0.1% or more and a preferable Si content is 0.12% or more. In contrast, when Si is added excessively, the ductility of ferrite in a steel is deteriorated and wire breakage is likely to occur. For that reason, the upper limit of an Si content is set at 1.5%, and a preferable Si content is 1.3% or less." (page 13, lines 10-19)
- "Mn is an element useful for securing the hardenability of a steel and enhancing the strength thereof. Mn of 0.3% or more (preferably 0.35% or more) is added in order to exhibit such functions effectively. In contrast, when Mn is added excessively, segregation occurs during cooling after hot-rolling and a supercooled structure, such as martensite, detrimental to wire drawability tends to form. For that reason, the upper limit of an Mn content is set at 1.0%. A preferable Mn content is 0.8% or less." (page 13, line 21, to page 14, line 2)
- "P is an element that deteriorates the toughness and ductility of a steel and hence the upper limit thereof is set at 0.02% in order to prevent wire breakage in the processes of wire drawing and subsequent stranding. A P content is preferably 0.01% or less, yet preferably 0.005% or less." (page 14, lines 4-9)
- "S, like P, is an element that deteriorates the toughness and ductility of a steel and hence the upper limit thereof is set at 0.02% in order to prevent wire breakage in the processes of wire drawing and subsequent stranding. A S content is preferably 0.01% or less, yet preferably 0.005% or less." (page 14, lines 11-16)

Clearly these statements found within Applicants' current specification provide a showing of "materially affecting the basic and novel characteristics of the claimed invention" as was determined in *AK Steel Corp. v. Sollac* with similar statements."

Accordingly, Applicants submit that the requested showing that “the introduction of additional steps or components would materially change the characteristics of Applicants’ invention” was previously provided. Therefore, the transitional phrase “consisting essentially of” should be construed as just that (i.e., consisting essentially of), rather than construed more broadly as “comprising”.

In addition, the Office makes note in the Advisory Action dated July 31, 2009, that “Cr and Ni are not included in claim 1, while Cr and Ni are further added into the alloy in claim 3.” Applicants note that dependent claims including additional elements of the alloy of the independent claim is (1) permissible by the use of “further consisting essentially of” and (2) does *not* change the scope of the *essential* elements as recited in the independent claim. In other words, for example, the essential elements of claim 1 are those recited in claim 1 under the transitional phrase “consisting essentially of” and those elements recited in dependent claim 3 (i.e., Cr and Ni) are therefore non-essential or else such elements would be required to be listed in claim 1. Accordingly, Applicants again submit that the transitional phrase “consisting essentially of” should be construed as just that (i.e., consisting essentially of), rather than construed more broadly as “comprising”.

§103(a) Rejections

A. Minami (“Drawing High-Grade Steel Wire Rods Without Heat Treatment”, Wire Journal International, Vol. 16, pp. 236-247, Sept. 1983)

Claims 1 and 18 are rejected under 35 U.S.C. §103(a) as obvious in view of *Minami*. Applicants respectfully traverse this rejection.

Applicants previously argued: (i) *Minami* discloses a one-step cooling process with a constant cooling rate (see Figs 2 and 4), while Applicants’ claim 18 recites a two-step cooling with each step having different cooling rate ranges; and (ii) the wire rods of *Minami* do not

meet the 4 mechanical property limitations (i.e., TS_{AV} , TS_{σ} , RA_{AV} , RA_{σ}) of Applicants' claims.

In response to these arguments, the Office currently asserts: (i) Figs 2 and 4 of *Minami* "are heat patterns of the steel, which clearly show the cooling rate changes" and "Applicants should explain why 'loop conveyor 8 is constant' will lead to one-step cooling" (Office Action, page 8, first full paragraph); and (ii) *Minami* "teaches the properties of the steel can be adjusted by the process" and "Applicants did not consider the processes factors during the calculations using the equations (1)-(4) in the instant claims, therefore, there is no comparison base to the [*Minami*] measured properties related to the [*Minami*] calculated properties as assumed by the Applicants" (Id.).

With respect to (i), Applicants offer the following explanation as requested by the Office. Figures 2 and 4 of *Minami* show Loop Conveyor 8 at the horizontal axis and that the temperature drops linearly during the Loop Conveyor 8 section of the processing. Accordingly, the cooling rate (rate not temperature) in Loop Conveyor 8 is constant (due to the linearity) with no change during the course of the cooling. In contrast, Applicants' claimed two-step cooling includes varying cooling rates (i.e., a rate of 8-20°C/sec first and then a rate of 1-5°C/sec). Therefore, Applicants again submit that the one-step cooling of *Minami* is not "similar" to Applicants' claimed two-step cooling in claim 18 as was previously alleged by the Office.

With respect to (ii), Applicants submit the following additional remarks. While it *may* be true that the mechanical properties as disclosed by *Minami* are not directly comparable to those claimed (due to the properties of *Minami*'s rods being calculated from 6.4 mm diameter rods with an unknown length and Applicants' rods being calculated from 5.0+ mm diameter rods with a 4 m length), it is evident from Table 4 of *Minami* that a reduction in tensile strength is obtained in *Minami*'s steel rods as compared to steel rods

produced via a “conventional process”. Furthermore, such a reduction in tensile strength is accompanied with the microstructure of the steel wire rod changing from “pearlite + bainite” to just “pearlite” (see Table 4). Accordingly, *Minami* attains a pearlite structure but at the expense of tensile strength. In contrast, Applicants’ attain a pearlite structure and improved tensile strength.

In addition, Applicants note that the Office has asserted that *Minami* “teaches a similar hot-rolled wire rod with the composition ranges overlapping or close to the claimed alloy” (Office Action, page 8, first full paragraph). However, “close to” is not the proper standard with respect to alleging a *prima facie* case of obviousness based on overlapping ranges, overlapping and/or touching ranges is the proper standard (see MPEP 2144.05). Furthermore, the rods of *Minami* are “Cr-V Steel” where Cr and V are assumed to be “essential” components of the steel as the name of the steel itself implies. The rods of *Minami* contain 0.50 wt% of Cr and 0.170 wt% of V. In contrast, Applicants’ claimed rods have 0.1% or less (excluding zero) of V, and Cr is not included as an essential component of the claimed rod “consisting essentially of” (see §112 remarks in above section with respect to Applicants’ claims being limited to essential components only as recited).

Accordingly, there is no overlap or touching of the amounts of V between *Minami* and Applicants, and *Minami* includes an additional essential component not listed in the essential components of the claimed rods (i.e., Cr). As such, a *prima facie* case of obviousness based on *Minami* does not exist for at least the reasons relating to the differing chemical make-ups of the steel wire rods.

Accordingly, for all of the foregoing reasons, Applicants again request withdrawal of this obviousness rejection.

B. *Kuroda* (US 6,372,056), *Tsukamoto* (US 5,156,692) and *Bae* (US 6,264,759)

Claims 1, 3, 5, 6 and 18 are rejected under 35 U.S.C. §103(a) as obvious in view of *Kuroda*. Claim 2 is rejected under 35 U.S.C. §103(a) as obvious in view of *Kuroda* and *Tsukamoto*. Claims 8, 10-13 and 15-17 are rejected under 35 U.S.C. §103(a) as obvious in view of *Kuroda* and *Bae*. Claims 9 and 14 are rejected under 35 U.S.C. §103(a) as obvious in view of *Kuroda*, *Bae* and *Tsukamoto*. Applicants respectfully traverse these rejections.

Applicants previously argued: (i) the exemplary embodiment of *Kuroda* does not disclose or suggest the claimed invention due to 3 claimed content limitations not being met (i.e., C, Si and P), and given such an exemplary embodiment, there is no motivation for one to consider a steel wire rod containing amounts of C above 0.57%, amounts of Si below 1.47%, and amounts of P below 0.011%; therefore, in accordance with *In re Sebek*, the determination of optimum values above 0.57% C, below 1.47% Si, and below 0.011% P is not obvious; and (ii) *Kuroda* fails to disclose or suggest all 4 mechanical property limitations as claimed (i.e., TS_{AV}, TS_σ, RA_{AV}, RA_σ).¹

In response to these arguments, the Office currently asserts: (i) “the general teaching for the composition ranges of [*Kuroda*’s] alloy overlaps all the composition ranges of the instant invention, which is a *prima facie* case of obviousness” and “Applicants have not provided any convinced [sic] data to prove the criticality” (Office Action, page 8, second full paragraph); and (ii) *Kuroda* “teaches a rolled spring steel superior in workability with tensile strength less or equal to 1200 MPa ... and reduction of area from 30% to 70%” (Id.).

With respect to (i), Applicants again point out *In re Sebek* (465 F.2d 902, 175 USPQ 93, 95 (CCPA 1972)) which stands for the principle that where the prior art disclosure suggests the outer limits of the general range of suitable values, and that the optimum resides within that range, and where there are indications elsewhere that in fact the optimum should

¹ As neither *Tsukamoto* nor *Bae* fulfill the deficiencies of *Kuroda*, *Kuroda* is discussed alone for brevity purposes (see response filed January 21, 2009, page 13).

be sought within that range (i.e., the examples), the determination of optimum values outside that range may not be obvious. Accordingly, as *Kuroda* suggests the outer limits of the general range of suitable values (i.e., the upper end of Si and P ranges [1.47% of 0.25-2.10% for Si, and 0.011% of < 0.035% for P], and lower end of C range [0.57% of 0.38-0.85%]), and the optimum resides and should be sought within those ranges, the determination of optimum values outside those ranges may not be obvious (i.e., claimed contents: C = 0.6-1.05%, Si = 0.1-0.85%, P = 0.02% or less). As such, Applicants request reconsideration of these remarks.

With respect to (ii), Applicants point out the description in the specification explaining the measurement of the claimed 4 mechanical properties of the steel wire rod (page 25, line 20, to page 26, line 1):

“A wire rod 20 m in length was cut out from the rolling top portion of the produced wire rod coil and then a wire rod 4 m in length was sampled out of the length of 20 m. 16 JIS #9B test pieces were prepared from the sampled wire rod and subjected to tensile test, and thereby the average value of tensile strength (TS_{AV}), the standard deviation of tensile strength (TS_σ), the average value of reduction of area (RA_{AV}), and the standard deviation of reduction of area (RA_σ) were measured, respectively.”

As can be determined from the above description, 16 test pieces are taken from each coil and then the average value and a standard deviation are calculated from those 16 test pieces for both TS and RA.

In contrast, *Kuroda* merely discloses a TS range and RA minimum and RA maximum (see e.g., Abstract). A standard deviation is calculated from several data points as it is a dispersion type calculation. Therefore, a standard deviation is not able to be determined from a minimum and maximum data point (i.e., the recited range) and is not able to be determined from a single data point (i.e., the only example disclosed). Accordingly, the Office has failed to show that *Kuroda* discloses or suggests the 4 claimed mechanical properties of the steel wire rod.

Thus, for all of the foregoing reasons, Applicants again request withdrawal of this obviousness rejection.

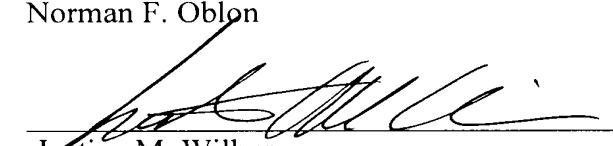
Conclusion

Applicants submit that all now-pending claims are in condition for allowance.

Applicants respectfully request the withdrawal of the rejections and passage of this case to issue.

Respectfully submitted,

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